

# Multiclass Perceptron Training

Consider the problem of categorizing sentences according to topic. For features, we can count the numbers of occurrences of keywords in an example. We can train on example data using the multiclass perceptron training algorithm. Use the three given training examples to update the weights below. Note that all weights have been started at 0, except the first bias weight, which we've set to 1, so that **we don't have to do any tie-breaking in this presentation**. The initial weights are generally arbitrary, since they will be automatically adjusted in accordance with the training data.

3 classes (topics): health, astronomy, cooking

Training examples, and their representations. [Bias, "explore", "new", "recipes", "therapies", "vaccines", class]

$e_1 =$	"explore new vaccines" (health)	[	1,	1,	1,	0,	0,	1,	health]
$e_2 =$	"explore new therapies" (health)	[	1,	1,	1,	0,	1,	0,	health]
$e_3 =$	"explore new recipes" (cooking)	[	1,	1,	1,	1,	0,	0,	cooking]

Weight vectors:

	[Bias, "explore", "new", "recipes", "therapies", "vaccines"]
$w_{\text{astronomy}}$	[ 1, 0, 0, 0, 0, 0 ]
	0 -1 -1 0 0 -1
$w_{\text{cooking}}$	[ 0, 0, 0, 0, 0, 0 ]
	1 1 1 1 0 0
	0 0 0 1 0 -1
$w_{\text{health}}$	[ 0, 0, 0, 0, 0, 0 ]
	1 1 1 0 0 1
	0 0 0 -1 0 1
	1 1 1 -1 0 2

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